

Siby Jose Plathottam
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PROFESSIONAL PROFILE

- System Modelling
- Deep Learning (FFNN, CNN)
- Optimization Algorithms
- Optimal Control Theory
- Python (Numpy, SciPy, Pandas)
- TensorFlow + Keras
- MATLAB + Simulink
- Amazon EC2
- Researcher
- Software Development
- Technical Article Reviewer
- Instrumentation Engineer

EDUCATION

Doctor of Philosophy in Electrical Engineering **December 2017**

University of North Dakota, Grand Forks, ND

Dissertation: *Optimal Control of Induction Machines to Minimize Transient Energy Loss*

Self-Driving Car Engineer Nanodegree – Term 1 **November 2017**

Udacity (online)

Major Projects: Driving behavior cloning, Vehicle detection, Traffic sign classification

Master of Technology in Instrumentation and Control **May 2011**

National Institute of Technology Calicut, Kerala, India

Thesis: *Optimal Control of Biomass Gasifier*

Bachelor of Technology in Electrical and Electronics Engineering **August 2007**

Mahatma Gandhi University, Kerala, India

Senior Design Project: *Temperature Control Valve for Conventional Gas Oven using PIC Microcontroller*

PROFESSIONAL EXPERIENCE

Postdoctoral Appointee – Energy Systems **January 2018 – present**

Argonne National Laboratory (ANL), Lemont, IL

Major Projects (ongoing):

- Python module for dynamic simulation of Solar PV Distributed energy resource (DER):
 - Implemented dynamic phasor model for voltage source inverter, current controller, and phase locked loop.
 - Implemented smart inverter features: Voltage ride through, Volt-VAR control, and Volt-Watt control.
 - Validated dynamics of the dynamic phasor model using Simulink PV DER model.
- Unsupervised Machine Learning on 2-year smart meter data from ComEd electric utility:
 - Developed a pipeline to create training batches from raw CSV files (200 GB) using Pandas and TensorFlow.
 - Trained a variational autoencoder to generate synthetic load curves at zip code level granularity.
 - Developed a workflow that utilized k-means clustering to identify households with electric vehicles.

Graduate Research Assistant **August 2013 – November 2017**

University of North Dakota, Grand Forks, ND

Major Research Projects:

- Deep Learning & Neural Network Controllers:
 - Built a classifier using a Convolutional Neural Network (CNN) to analyze 24-hr wind power and load data.
 - Developed a supervisory control system using a feed-forward neural network that can generate optimal stator current setpoints for an induction machine drive in real time using rotor speed and rotor flux feedback.
 - Developed a template training algorithm for neural network motor controller using raw sensor data.
- Optimal Control of Field-oriented Induction Machines:
 - Used Pontryagin's minimum principle and conjugate gradient methods to find a numerical solution (optimal current and flux trajectories) to the induction machine transient energy loss minimization problem.

- Derived analytical expressions to describe the energetically optimal current and flux trajectory for a generic induction machine during speed transients.
- Optimal generation scheduling for renewable power generation:
 - Solved economic dispatch, and optimal power flow problems involving renewable & conventional generation using Particle swarm optimization, Simulated annealing, and Non-linear programming (in AMPL).
 - Proposed a cost function using Levelized cost of energy (LCOE) to dispatch generation within a Control Area from multiple wind farms, and conventional power plants in an economically equitable way.

Voluntary Scholarly Activities:

- Mentored an undergraduate student during his 2018 summer internship at ANL in smart meter data analytics.
- Research proposal on load forecasting using unsupervised deep learning to ANL LDRD seed grant (2018).
- Research proposals to NSF DCSD program and European Commission MSCA fellowships (2017).
- Conducted three TensorFlow tutorials for graduates & undergraduates at University of North Dakota in 2017.
- Paper review: multiple papers from three IEEE journals, four IEEE conferences, and other reputed journals.

Achievements:

- Received the runner up award for best paper in the ITS workshop at COMSNETS 2018 conference.
- Received the NSF sponsored ND EPSCoR Doctoral Dissertation award in 2015 totaling \$44,000 over 2 years.
- First author of 3 peer-reviewed journals, 7 IEEE conferences, and 4 posters during PhD program.

Graduate Teaching Assistant

January 2014 – May 2017

University of North Dakota, Grand Forks, ND

- Graded assignments, and developed course material for Electric drives, and Renewable Energy courses.

Senior Engineer – PADO Projects

May 2011 – May 2012

Assistant Manager – PADO Projects

June 2012 – July 2013

Steag Energy Services India, New Delhi, India

Primary Role: Deployed, tested, and provided support for Steag’s thermal power plant Performance, Analysis, Diagnosis, and Optimization (PADO) software suite at 3 different plants.

- Developed user interface, and configured data link between plant DCS and Steag’s data management system.
- Trained and deployed data validation module based on Self Orienting Maps, troubleshot faulty process measurement tags in DCS, and identified malfunctioning process control loops

Achievements:

- Development: Unit commitment algorithm using open source linear programming software LPSolve.
- Development: Fault tree logic to diagnose root causes during abnormal operating incidents in power plant.
- Project Management: Mentored and led a team of trainee engineers onsite at a 4x600 MW power plant in Odisha for 6 months and deployed Steag’s computerized maintenance management system (CMMS).

Engineer – Instrumentation

January 2008 – July 2009

W2E Projects and Systems, Cochin, India

Primary Role: Aided process engineer in preparing P&ID’s, IO lists, instrumentation RFQ’s, and plant control logic; supervised technicians during the engineering, and commissioning activities for a 1 MW waste to energy gasification power plant.

SELECTED PUBLICATIONS (<https://scholar.google.com/citations?user=wI5irCoAAAAJ>)

- **S. J. Plathottam**, H. Salehfar, “Transient Energy Efficiency Analysis for Field Oriented Induction Machines,” *IEEE Access*, vol. 5, pp. 20545 - 20556, September 2017.
- **S. J. Plathottam**, H. Salehfar, “Unbiased Economic Dispatch in Control Areas with Conventional and Renewable Generation Sources,” *Electric Power System Research*, vol. 119, pp. 313–321, February 2015.
- **S.J Plathottam**, P. Ranganathan, “Next Generation Distributed and Networked Autonomous Vehicles: Review,” *IEEE International Conference on Communication Systems and Networks*, 2018, pp. 577-582.
- **S.J. Plathottam**, H. Salehfar, P. Ranganathan “Convolutional Neural Networks for Power System Big Data Analysis,” *North American Power Symposium*, 2017, pp. 1-5.